Teaching Reading in Mathematics

Strategies for Content Area Reading

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With much appreciation to the writers of *Teaching Reading in Mathematics*, Barton and Heidema, McREL

Teaching Reading in Mathematics

- Vocabulary Development
  - Concept Circles
  - Frayer Model
- Informational Text
  - K-N-W-S (K-W-L for Word Problems)
  - Graphic Organizer
- Reflection Strategies
  - Learning Log

Concept Circles
(Preactive, Interactive, Reflective)

- What is it?
  - Versatile categorization strategy
  - Relate terms conceptually to one another
  - Students identify common attributes or a concept relationship among several terms
  - Pre-reading to introduce new concepts
  - Reinforce and extend knowledge of concept

Concept Circles

- How could it be used in mathematics instruction?
  - Pre-reading activity
    - Students predict and discover relationships, beginning process of defining a concept
  - Reinforcement or extension activity
    - Students identify a concept that relates several terms, thinking about common attributes and extensions

Concept Circles

- How to use it:
  1. Choose common attributes or relationships among a number of terms.
  2. Draw a circle divided into sections (3 to 6) and put a term or word or phrase into each section, all of which have the identified attributes or are related in a similar way.
  3. Direct students to identify the common attributes or name the relationship that exists among the terms in all sections of the circle.

Concept Circles

Modifications:

Leave a section of the circle empty and direct students to identify the concept relating all the terms given in the other sections and fill in the empty section with a new term/example that fits.

Choose a term for one section of the circle that is not an example of the concept and terms for all the other sections that are examples. Students identify the term that does not fit and the concept.

Frayer Model

(Preactive, Interactive, Reflective)

- What is it?
  - Word categorization activity that helps learners develop their understanding of concepts
  - Generally, students provide a definition, list characteristics or facts, and provide examples and nonexamples.

Frayer Model

- How could it be used in mathematics instruction?
  - Provides students with the opportunity to understand what a concept is and is not
  - Gives students an opportunity to communicate their understanding and to make connections by providing examples and nonexamples from their own experience with the concept

Frayer Model

- How to use it:
  1. Assign a concept that might be confusing because of its relational qualities.
  2. Explain the Frayer model diagram.
  3. Model how to fill out the diagram.
  4. Give the students time to practice with assigned terms.
  5. Once the diagram is complete, let the students share their work with other students.

K-N-W-S

(K-W-L for Word Problems)

(Interactive, Reflective)

- What is it?
  - Students use a worksheet to analyze and plan how to approach solving a word problem
  - Students answer what facts they KNOW, what information is NOT relevant, WHAT the problem asks them to find, and what STRATEGY they can use to solve the problem.

K-N-W-S
(K-W-L for Word Problems)

- How could it be used in mathematics instruction?
  - Can engage students in exploration of word problems as they decode the given information, determine the question, and select an appropriate solution method.
  - Can provide the teacher with the opportunity to evaluate students' understanding and check for misconceptions.

K-N-W-S
(K-W-L for Word Problems)

- How to use it:
  1. Introduce students to the four-column KNWS worksheet.
  2. Present students with a word problem, and model how to fill in information in each of the columns. Explain how you knew what information should be included in each column; teachers often show "how" but don't explain "how you know."
  3. Ask students to work in groups to complete KNWS worksheets for other problems. Ask students to discuss with their groups how they knew what to put in the columns.
  4. Give students ongoing independent practice using this strategy to solve word problems. Periodically ask students to write an explanation of their reasoning process.

K-N-W-S

(K-W-L for Word Problems)

QuickTime™ and a
Sorenson Video 3 decompressor
are needed to see this picture.

Graphic Organizer

(Preactive, Interactive, Reflective)

- What is it?
  - Webs, maps, charts, diagrams
  - Visual representation of key concepts and related terms, helping students see how ideas link together
  - Effective tools for thinking, note taking, and learning
  - Represent abstract ideas in concrete form

Graphic Organizer

- How could it be used in mathematics instruction?
  - Incorporated throughout a lesson or unit
  - Used to engage students by having them share what they know about a topic
  - Make connections, explain relationships, elaborate on what they have learned
  - Used to evaluate students' understanding and check for misconceptions

Graphic Organizer

- How to use it:
  1. Explain the purpose and benefits of using graphic organizers.
  2. Introduce a specific form of graphic organizer.
  3. Model how to use the selected organizer.
  4. Provide multiple opportunities for students to practice using graphic organizers.
  5. Encourage students to construct their own organizers.

Learning Log
(Preactive, Interactive, Reflective)

- What is it?
  - Effective means of writing-to-learn
  - Can foster reflection on reading processes and hands-on activities to increase students' understanding
  - Focus on content covered in class, rather than personal or private feelings
  - Introduce as way of writing down thinking

Learning Log

- How could it be used in mathematics instruction?
  - Incorporated across mathematics lessons
  - Examine a concept more closely as collect data or work with examples
  - Formulating explanations helps students know if they really understand a concept
  - Helps students self-evaluate

Learning Log

- How to use it:
  1. Assign the topic. A learning log entry can be assigned at any time dung class, depending upon the topic and your purpose.
  2. Allow students ”think time” to consider their response.
  3. Give students time to write about the topic.
  4. Encourage students to reread their learning log entries at a later date and reflect on how their ideas have changed.